Lindø Component
and Structure Testing

FORCE TECHNOLOGY

Mechanical Tests of Large Structures

Large area strong floor with reaction walls

Mechanical testing of sub-components or construction materials, often found as cut-out parts, is widely used to determine compliance with standards or other requirements. However, how about the performance when the full-size sub-systems are assembled into complete systems?

In the mechanical test bench, testing of large components and structures can be done in a set-up with applied forces similar to real operational conditions.

The strong floor is 9 x 20 metres with inter-related reaction walls, 4 metres in height, along two sides of the plane.

Different operational conditions – different testing

This large testing construction makes it possible to test full size structures with a three dimensional stress and strain set-up.

This is particularly relevant for constructions exposed to multi-directional stress loads from e.g. waves, wind or other externally imposed forces and correspondingly for constructions exposed to alternating rotating loads.

Testing can be prepared as simple strain robustness tests or as fatigue testing. A key feature for the test bench is the possibility to apply recorded loads from existing constructions to simulate a realistic combination of fatigue influencing loads while simultaneously sustaining any secondary loads on the construction.

Testing for a combination of strain and corrosion

In a sea environment, submerged metallic structures will inevitably be exposed to both mechanical loads and corrosion, which might lead to structural failures caused by corrosion fatigue. In most cases corrosion fatigue will develop differently – in some cases dramatically differently – from "dry" fatigue.

Customised corrosion fatigue test set-ups can also be prepared in the test bench, introducing seawater exposure to fatigue relevant areas of the structures.

Customising the data recordings

In cooperation with our clients, we aim for cataloguing the optimal data recording to uncover all desired parameters relevant to the operational context.

Data recording could be done utilising e.g. strain gauges, laser distance sensors, moiré scanners or any other preferred way of recording the behaviour of the structure. Our specialists will in any case be able to assist you in arranging the test set-up.

Documentation of the durability

We work with two different test scenarios. You can either be in charge of the test and the following documentation of results yourself with us as operator of the facility. Or we operate the facility for you and prepare a report with your required documentation of test results.

The test scheme is prepared in close coorporation with our clients to comply with test standards or alternatively the client's requirements. Documentation for the test performance is delivered according to requisites given in the standards. Alternatively, extended reports with supplementary parameters, e.g. results from metallography, verifying calculations, S-N curves etc. can be distributed.

The infrastructure is ideal in relation to shipping and handling large structures.

Various programmes are developed to suit the testing requirements: Sinus, abrupt, saw tooth etc.

Specifications for the mechanical test bench

Size (floor):	20x9 m
Size (walls):	13x4 m and 9x4 m (WxH)
Max. test length:	Up to 50 m item length
Frequency:	0.25 Hz @ max. load
Max. static load:	60 mega Nm

The possibility of testing full-scale systems or greater parts of systems will give you the required documentation for the construction's durability as close to real-world effects as it is possible.

Strategic partnership for the benefit of industry

The new facility for developing and testing large components and structures has been established in a former shipyard near Odense, in Denmark.

FORCE Technology has assisted industries world-wide with challenges relating to materials for more than 70 years, during which the vast experience accumulated has been converted to substantial values for our customers.

Because we are constantly striving to develop advanced materials and testing solutions, FORCE Technology has formed a strategic partnership with Lindoe Offshore Renewable Centre (LORC) in order to offer tests of large components and structures.

Other services

Lindoe Component and Structure Testing A/S also offers related testing and development services:

- Climatic Tests of Large Components
- High Power Laser Welding
- Rain Erosion Testing.

Further information
Søren Gothil Hansen: Phone +45 22 69 75 80 / E-mail: sgh@force.dk.
Eric Putnam: Phone +45 22 69 71 98 / E-mail: erp@force.dk.
Lars Nøhr-Nielsen: Phone +45 22 69 73 68 / E-mail: lnn@force.dk.